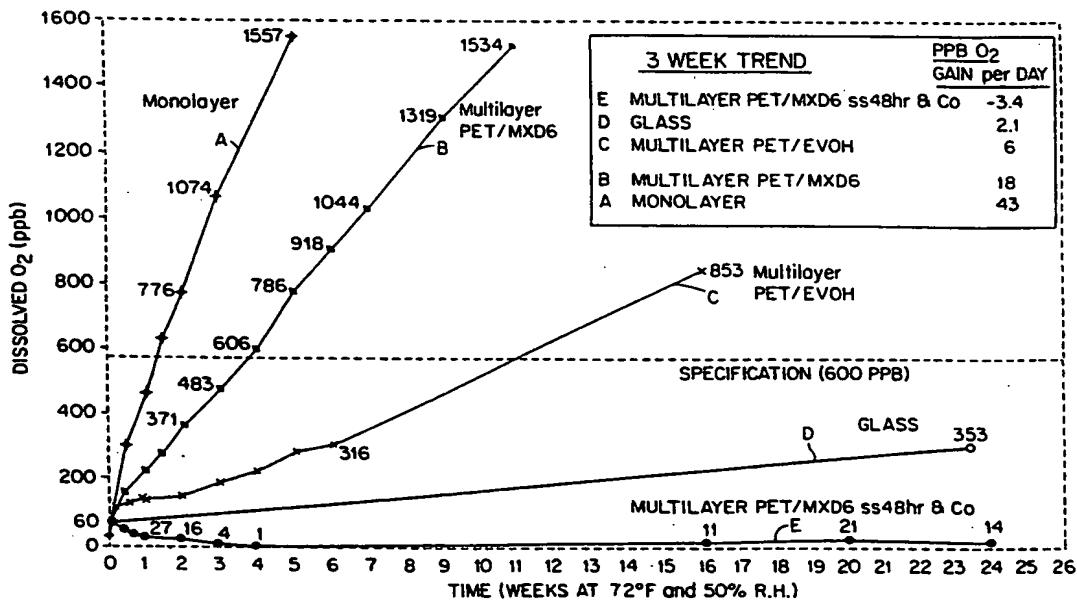




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : C08K 5/098, B32B 27/18, 27/34, 33/00, B65D 65/38, 81/26, C08K 5/00, C08G 69/48, 69/46, C08K 3/08		A3	(11) International Publication Number: <b>WO 99/38914</b>
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(54) Title: ENHANCED OXYGEN-SCAVENGING POLYMERS, AND PACKAGING MADE THEREFROM



## (57) Abstract

Oxygen-scavenging polymers and packaging for holding oxygen-sensitive products. A heat treatment process has been found to significantly increase the oxygen-scavenging performance of the polymer. The enhanced scavenging polymer can be effectively incorporated into various packaging, including transparent multilayer containers for beer and juice. In one embodiment, a multilayer package made from the scavenger provides an actual reduction in oxygen content of a contents of the package, over a long period of time (e.g., 24 weeks). The package can be stored unfilled for an extended period (without significant loss of scavenging capability) and will scavenge substantially immediately upon filling with a liquid product. The package may incorporate a relatively low weight percentage of the scavenger, thus providing enhanced scavenging in a cost-effective manner.

# INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER					
IPC 6	C08K5/098	B32B27/18	B32B27/34	B32B33/00	B65D65/38
	B65D81/26	C08K5/00	C08G69/48	C08G69/46	C08K3/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 C08K B32B B65D C08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	EP 0 520 257 A (GRACE W R & CO) 30 December 1992 (1992-12-30)	1-12, 15, 24, 25, 27, 30-37, 39, 40, 58-60, 62-64, 68, 70, 76, 78, 79
X	page 2, line 24-32 -page 3, line 46, 47; claims 1-3, 14-17, 22, 25, 26, 28-36	5
X	page 4, line 19-34-36 -page 5, line 32-46-54; examples 10, CONTROL, 1-2	3, 30-32,
X	page 6, line 20-26-42 -page 7, line 18-33-44	37
A	page 7, line 44-53-56	9-11
Y		16-22, 26, 28, 29 23-25, 27, 67, -/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

### \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

9 March 2000

Date of mailing of the international search report

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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International Application No

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	US 5 866 649 A (CORNELL STEPHEN W ET AL) 2 February 1999 (1999-02-02) claims 1-7,10-12,27-35 —	55,56,72
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## INTERNATIONAL SEARCH REPORT

Int'l application No.  
PCT/US 99/02312

### Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

#### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-54,58-71,73-82

The claims of the first subject define (1) oxygen scavenging polymeric compositions for aqueous liquid (beer) packaging to achieve oxygen removal from the liquid. This concept includes also (2) a method of heating a PA + 200ppm Co O<sub>2</sub>-scavenger composition at low level O<sub>2</sub> atmosphere and (3) removing oxygen content of a packed liquid at low ppm level and maintaining it there for months.

2. Claims: 55-57, 72

Method of reducing the melt index of polyamide by adding a metal to it.

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